

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: George F. Thagard, III, et al.
Appl. No.	: 10/772,049
Filed	: February 4, 2004
For	: MODIFIED ASPHALTIC FOAM MATERIALS
Examiner	: John M. Cooney
Group Art Unit	: 1711

DECLARATION OF CASEY TZENG

**Mail Stop Amendment**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

I, Casey Tzeng, declare and state:

1. I have worked in the roofing industry for 27 years, and have developed methods for producing asphaltic foam for use in the manufacture of molded articles such as ridge caps and roofing tiles. I have extensive experience in the chemistry of asphalt and other components used in the manufacture of asphaltic foams. My resume is enclosed as Exhibit A. From 1979-1992, I was Plant Manager/Quality Control Manager at Lunday-Thagard Roofing/Asphalt Products, South Gate, California. From 1992-1993, I was a Process Engineer/Quality Control Manager at GS Roofing, South Gate/Wilmington, California. From 1993-2001, I was Director of Research and Development at Fontana Paper Mills, Fontana, California, the assignee of the present invention. At Fontana Paper Mills, I developed the company's asphalt specifications and developed asphalt extended rigid urethane foam for use in production of ridge cap and shingle roofing products. From 2001-2003, I was Vice President of Manufacturing at Malarkey Roofing, Portland, Oregon, where I identified new products for development and improved the overall quality of the existing product line. From 2003-2004, I was a consultant within the roofing

industry for both raw material suppliers and manufacturers. I am currently Director of Technical Services and Research and Development at Fontana Roofing Products, Fontana, California, where I am responsible for improving production efficiency, cost reduction and product quality improvement. I am leading development efforts for new product development.

2. I am familiar with the above-referenced application and pending claims. I have read the Office Action mailed May 31, 2006, and am very familiar with the Roy and Tzeng patents cited by the Examiner. In fact, I am a co-inventor of the Tzeng patent.

3. For 20 years, we had been trying to develop a process for making asphaltic foam suitable for preparation of ridge caps and other roofing materials. Our process involved combining liquefied asphalt, a polyol, and other standard additives into a mixture at high temperatures (e.g., 200°F). This high temperature was necessary to produce a homogeneous mixture or the asphalt would separate from the asphalt/polyol mixture. However, this resulted in an uncontrolled, violent reaction in which the resulting foam: 1) expanded beyond a mold into which the reaction mixture was placed; or 2) partially cured (hardened) before a mold was filled. Both of these occurrences resulted in molded articles (e.g., roofing tiles and ridge caps) that were incompletely formed or over-molded, and therefore unacceptable.

4. I performed the method described in the Roy patent to produce an asphaltic foam at 200°F. The contents of the mixtures used are shown in Table 1 below. Briefly, I mixed 36.5 g of asphalt with 73 g of polyol mixture (remaining components in Mixture B). The index ratio of isocyanate to asphalt/polyol mixture was 1.1-1.2.

**Table 1**

**Mixture A**

Component	Amount (g)	Type of compound
M 20 S	74.11	isocyanate

**Mixture B**

Component	Amount (g)	Type of compound
Saturant 701	36.5	asphalt
GP 430	10	Polyol
PLURACOL 355	25	Polyol
PLURACOL 975	25	Polyol
Dab.DC 5357	1.7	Surfactant
TCPP	9.8	Flame retardant
Water	0.94	Blowing agent
Policat 8	0.3	Catalyst
Polecat 41	0.3	catalyst

When mixture A at ambient temperature was combined with mixture B at 200°F, the reaction was exceedingly violent and the foam could not be contained within a mold. Thus, this foam formulation was not suitable for production of a usable molded product.

5. In the method described in the foregoing paragraph, separation of the asphalt from the asphalt/polyol mixture was avoided by keeping the mixture at high temperature. However, as described above, the high temperature reaction was extremely violent. Thus, I also performed the method described in the foregoing paragraph at a temperature of less than 200°F. At the lower temperature, the asphalt separated from the asphalt/polyol mixture. The resulting foam contained

"stringy" asphalt due to undesirable partial curing of the foam, and was unsuitable for production of a molded product.

6. I also produced an asphaltic foam using the method described in the present claims. I prepared mixtures A and B as described in Table 2 below, but these mixtures were maintained at 125°F separately. Thus, the asphalt/isocyanate and polyol components were segregated. These two mixtures were put into a HITECH high pressure impingement machine and forced through separate impingement dispensing heads at an output of 8 lbs/min to combine the two mixtures. This resulted in a controlled reaction, and production of a proper foam that did not rise prior to filling a mold, and did not expand beyond a mold into which the reaction mixture was placed. Because the asphalt and isocyanate were totally homogeneous, there was no separation of the asphalt which enabled the reaction to be performed at a lower temperature, resulting in a more controlled reaction. This method unexpectedly allows the two mixtures to be combined at a lower temperature, resulting in a controlled reaction and a foam that can be used to make molded articles.

**Table 2**

**Mixture A**

Component	Amount (g)	Type of compound
Saturant 701	36.5	asphalt
M 20 S	74.11	isocyanate

**Mixture B**

Component	Amount (g)	Type of compound
GP 430	10	Polyol
PLURACOL 355	25	Polyol
PLURACOL 975	25	Polyol
Dab.DC 5357	1.7	Surfactant

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TCCP	9.8	Flame retardant
Water	0.94	Blowing agent
Policat 8	0.3	Catalyst
Polecat 41	0.3	catalyst

7. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or patent issuing therefrom.

Dated: Nov. 27, 2006

By: Casey Tzeng  
Casey Tzeng

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